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DRAFT INFORMATION REQUIREMENTS DOCUMENT

PROPOSED SLAVE RIVER HYDROELECTRIC PROJECT

Alberta

Canada

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DRAFT INFORMATION REQUIREMENTS DOCUMENT

PROPOSED SLAVE RIVER HYDROELECTRIC PROJECT

Alberta

Canada

Canada Alberta

April, 1984

Dear Sir or Madam:

RE: DRAFT INFORMATION REQUIREMENTS DOCUMENT
PROPOSED SLAVE RIVER HYDROELECTRIC PROJECT

This document is being made available in keeping with the announcement made by the Honourable F. Bradley, Minister of the Environment for Alberta and the Honourable C. Caccia, Minister of the Environment for Canada, that they have agreed to coordinate the provincial and federal reviews of the proposed Slave River Hydroelectric Project.

This document contains the two separate draft information requirements for the Governments of Alberta and Canada. These two drafts will be integrated, following public consultation at a later time, into a single integrated information requirements document.

Inquiries concerning these draft guidelines should be directed to the persons specified in Part 1 and Part 2 of this document.

Yours truly,

R. Greyell, Executive Secretary Slave River Hydro Environmental Assessment Panel	K.R. Smith Assistant Deputy Minister Environmental Evaluation Services Alberta Environment

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INTRODUCTION

TransAlta Utilities Corporation, Alberta Power Limited and the Government of Alberta are undertaking feasibility studies for a hydroelectric generating facility on the Slave River. To date, no decision has been made on the future of this project. Should it proceed the Governments of Alberta, Canada, The Northwest Territories and Saskatchewan have agreed to coordinate their review processes and integrate the information they require from a proponent. Such coordination will eliminate duplication of effort and facilitate the review of a project by government and the public.

This effort is being made to promote the preparation of one comprehensive report by a proponent which will meet the information requirements of the Governments of Alberta, Canada, The Northwest Territories and Saskatchewan.

Part 1 of the attached document outlines draft Alberta requirements including Saskatchewan's information needs. To date no public comment has been solicited regarding Alberta requirements. Part 2 contains interim FEARO requirements including information needed by the Government of The Northwest Territories and incorporates submissions from the general public made to the Panel at a series of public meetings held in October/November, 1982.

Once a proponent is identified or it becomes clear that a hydroelectric project will proceed to the regulatory process the Federal Environmental Assessment Panel and the Alberta Energy Resources Conservation Board will carry out a public consultation process to refine information needs against a more clearly defined project description. To facilitate this public consultation a draft, integrated document will be developed and distributed. Subsequently, a final integrated information requirements document will be prepared and issued. The proponent will use this information to prepare and submit the required applications for review at subsequent public hearings.

Notwithstanding the information requirements outlined in this document, any proposed hydroelectric development would be subject to government regulatory processes involving public review and evaluation.

PART 1

DRAFT
SLAVE RIVER HYDROELECTRIC PROJECT
APPLICATION GUIDELINES
FOR
ALBERTA REQUIREMENTS

PART 1

DRAFT
SLAVE RIVER HYDROELECTRIC PROJECT
APPLICATION GUIDELINES
FOR
ALBERTA REQUIREMENTS

Slave River Hydroelectric Project
Application Guidelines
for Alberta Requirements

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GOVERNMENT CONTACTS

For more information about Part 1 of these guidelines please contact the following:

Energy Resources Conservation Board
640 - 5th Avenue, S.W.
Calgary, Alberta
T2P- 3G4

Attention:

Manager
Hydro & Electric Department

(403) 297-8515

Alberta Environment
9820 - 106 Street
Edmonton, Alberta
T5K-2J6

Attention:

Director
Planning Division

(403) 427-2371

or:

Director
Environmental Assessment Division
(403) 427-6209

1. INTRODUCTION

1.1 Nature and Scope of these Guidelines

The proposed Slave River Hydro project, if implemented, will be a major generation addition to the Alberta electric system. The project location is in Northern Alberta. It may affect a large geographic area, parts of which may be ecologically sensitive, and will require long transmission lines to connect the power plant to the Alberta electric system.

Whereas the Applicant will, in due time, require other approvals and licences for the construction of all or parts of the project, the initial requirements in Alberta which refer to the project as a whole are:

- one or more applications to the Energy Resources Conservation Board (ERCB) for approval of construction and operation of the hydro facilities and the transmission lines under the Hydro and Electric Energy Act; and
- submission of an Environmental Impact Assessment (EIA) Statement to Alberta Environment pursuant to the Land Surface Conservation and Reclamation Act. The EIA would form part of the submission to the ERCB.

The present guidelines have been prepared jointly by the Energy Resources Conservation Board and Alberta Environment to assist the Applicant with the definition of the information required to support the above mentioned applications and to prepare an Environmental Impact Assessment Statement. In this particular case all impacts which are expected to occur both within and beyond Alberta's territorial boundaries should be described as they may be relevant to the review of the project by the Energy Resources Conservation Board or by Alberta Environment.

These guidelines do not incorporate the requirements of applications for licences and approvals under all Alberta legislation. In particular, the Applicant should seek clarification of the specific information requirements of the Controller of Water Resources for a Water Power Licence to use, direct or store water, pursuant to the provisions of the Water Resources Act, the Provincial Water Power Regulations and the Dam and Canal Safety Regulations.

1.2 Interpretation of these Guidelines

In the interpretation of the requirements identified in these guidelines, the Applicant is required to observe the intent of the guidelines rather than to narrowly interpret the requirements identified in specific terms herein.

The Applicant is invited to discuss the guidelines and the manner in which it intends to respond to them with staff of the Board, Alberta Environment and other relevant agencies. To facilitate such discussions, the Applicant should submit to Alberta Environment a detailed Work Plan which indicates how it intends to meet the requirements of the guidelines included in the document with respect to the Environmental Impact Assessment. With respect to the transmission lines and facilities, these guidelines include descriptions of the information required as part of the submission for the Project but the Applicant is also referred to ERCB Guide G-22 (1981) for guidance in respect of the general technical and environmental requirements of an application for a transmission line.

In general, two levels of detail may be distinguished. The most detailed presentations of data, technical descriptions and impact analyses are required with respect to the specific project configuration (hereinafter called the Preferred Project) for which an application is made. If the Applicant wishes to submit alternative configurations with which it would be prepared to proceed should approval be given, then this same level of detail shall be provided for each alternative.

Where specific alternatives to the Preferred Project, including transmission line routes, have been identified and subsequently rejected by the Applicant in favour of the Preferred Project, sufficient information should be supplied to demonstrate the appropriateness of the choice of Preferred Project considering all relevant technical, economic, financial, environmental and social aspects of that decision.

1.3 Definition of the Project Area

The Project area is defined as that area in which the Project is expected to have measurable, or otherwise significant physical, environmental or socio-economic impacts. Thus the boundaries of the Project area may vary with the type of impact considered, since the boundaries are located where the impact becomes insignificant. The Applicant must provide evidence, case by case, for the delineation of environmental or socio-economic impact areas. For example, if Lake Athabasca is contemplated as a storage reservoir for the project or if water levels of that lake are otherwise to be affected by the project then the Applicant must identify and assess the full range of physical, biological and socio-economic affects the project induced changes would have in both Alberta and Saskatchewan.

The Project area will be affected by the definition of the scope of the Application, that is to say, whether all or part of the transmission line and its associated facilities required to interconnect the power plant with the Alberta electric system are included as part of the Application. With respect to the EIA, the Applicant shall at least include the routing of that part of the transmission facilities where impacts of the Project affect the same geographic areas, that is to say, to some point south of the Peace-Athabasca delta and Lake Athabasca.

1.4 Comparative Analysis

Whenever appropriate, analyses of economic, financial, social and environmental impacts and effects shall be presented to facilitate a "with this project" and "without this project" comparison.

The "without this project" condition is the situation which is expected to prevail in the future if the Development is not implemented. It will include, in relevant cases, the hydro, thermal power plants, or other alternatives to the project.

In the Project area, as defined in Section 1.3, the "without this project" condition should include other projects which are being implemented or are expected to be implemented within the period of analysis wherever the descriptions of these are in a sufficiently advanced stage of preparation to permit a preliminary evaluation of their impacts. The intent of this requirement is to ensure that the impacts of the Slave River Hydro Project together with other significant projects are sufficiently well defined to assess the combined impacts.

Possible projects which are insufficiently defined to permit a reasonable impact analysis shall be addressed as part of the sensitivity analysis of the assessed impacts to variances in external conditions.

1.5 Public Participation

The Applicant should provide opportunities for and encourage public participation during the preparation of its EIA. The intent of providing for public participation is to keep those who will be affected by the Project informed of the Applicant's intentions and to provide the opportunity for them to express their concerns and to contribute to the impact assessment and proposed mitigation programs. Public participation should include providing opportunities for local residents to participate in the design, execution, and review of the results of the studies, surveys and investigations undertaken for the preparation of the Applicant's submission.

The Applicant should organize a public participation program and publish notices advising that the applicant is preparing a submission including an Environmental Impact Assessment to the regulatory authorities. The notices should also advise about opportunities for public participation.

The Applicant's submission to the ERCB should include a report on the public participation program, a review of the concerns expressed and suggestions made and an indication of how these concerns and suggestions have been reflected in the design, proposed operating policies, mitigation and monitoring proposals.

The public participation program shall cover all areas affected by the Development. Special efforts shall be made under the program to communicate with organized groups such as municipal and native councils, metis organizations, fishing, hunting and trapping associations and environmental groups. Nevertheless, communications should not be limited to organized interest groups and opportunities should be provided for participation by all individuals with a concern or interest.

The Applicant should submit to Alberta Environment, as early in its study program as possible, a plan which outlines its specific proposals regarding a public participation program.

1.6 The Applicant's Submission

In response to these guidelines, the Applicant is expected to prepare one submission which will support applications to the Energy Resources Conservation Board and will include an Environmental Impact Assessment Statement.

The Applicant is free to choose the order and format of the material to be presented. The submission should, however, facilitate reference to the requirements for information specified in these guidelines.

Descriptions of facilities, resources, impacts and mitigation measures should be identified by major geographic areas such as the Wood Buffalo National Park, the Peace-Athabasca delta, native reserves, the Northwest Territories, Saskatchewan and Alberta. For many aspects, attempts to separate the discussion by geographic area will result in considerable duplication and this should be avoided. One way in which this information could be achieved is through the preparation of summary documents for each region. In that case, the main documents would contain the comprehensive description of all aspects of the Project and the summaries would highlight relevant aspects of the Project in each geographic area with ample cross-references to these main documents.

The Applicant is expected to discuss its intentions regarding publication and distribution of the documents to be submitted. The Applicant may wish to consider an overall organization such as the following:

i) A separate summary of the submission intended for wide distribution, written in non-technical language and highlighting all major characteristics and issues.

ii) The submission itself, in one or more volumes as may be appropriate. This document would be distributed to all relevant government and private agencies, to all participants in the various hearings, and to a number of libraries. These guidelines refer to this document.

iii) Other background documents, which would neither form an integral part of the submission nor be evidence for the submission, might be deposited in selected libraries only. An example of such documents might be the Slave River Hydro Feasibility Report and its supporting reports.

2. GUIDELINES FOR PREPARATION OF THE APPLICANT'S SUBMISSION

The guidelines are subdivided into five parts. Part A describes the requirements for an overview of all relevant information, data, impacts and mitigation measures. This overview is a part of the main submission, not the separate summary referred to in Section 1.6.

Part B outlines the requirements for a technical description of the Preferred Project(s) together with documentation of its economic and financial implications.

Part C describes the requirements for an Environmental Impact Assessment including proposals for enhancement and mitigation of impacts.

Part D describes the documentation which will support selection of the Preferred Project(s), a description of alternatives studied but not favoured and the criteria adopted for defining the Preferred Project together with sensitivity analyses to alternative assumptions.

Part E indicates the requirements for a Summary and Conclusions section of the Applicant's submission.

PART A PROJECT OVERVIEW

This section shall contain a description of the Applicant and an overview of the Project for which this application is submitted. The minimum requirements are as follows:

A.1 The Applicant

- the name of the Applicant or Applicants, details of the incorporation of each Applicant, the share in the Project that each would have, and who would manage and operate the Project;

A.2 Approvals and Licenses

- an enumeration of specific approvals and licenses which the Applicant seeks to obtain from Alberta with the present submission; also references to specific sections of Acts pursuant to which the applications are made;

A.3 Description of the Project

- a summary description of all Project facilities, including the transmission, whether principal or auxiliary, accompanied by appropriate maps, engineering drawings and estimated costs;

- a description of key Project characteristics with reference to Project integrity and safety during each of the construction and operation phases;

- a summary review of construction methods and schedules, operation and maintenance requirements or procedures and any plans for orderly abandonment of the Project at the end of its useful life;

- a map of the total Project area suitable for public notice;

A.4 The Need for the Project

- an overview of the load forecast and all factors considered in its development together with an overview of all alternative forecasts considered;

- an overview of the likely impacts of imports and exports as well as non-traditional and dispersed energy technologies on the demand for power from the Alberta electric system;

A.5 Existing Environmental and Resource Use

- a description of the current economic, social, physical and biologic environment and of current resource use in the Project area;

A.6 Impact Analysis

- an overview of the Project impacts during each of the pre-construction, construction and operational phases of implementation, under the following categories:
  - economic impacts in Alberta, adjacent provinces and Territories and in the rest of Canada;
  - financial impacts on the Applicants' organizations, and on Alberta's power consumers;
  - socio-economic impacts including financial impacts on communities in the Project area; and
  - environmental impacts;

A.7 Mitigation and Enhancement Proposals

- a discussion of proposals, during each of the pre-construction, construction and operational phases, aimed at mitigation of negative impacts and enhancement of impacts deemed beneficial;

A.8 Alternatives to the Preferred Project

- a statement of the reasons for preferring the Slave River Hydro Project as a source of power and energy, relative to alternative sources, for the Alberta electric system;
- a description of the alternative Project configurations, including transmission systems and routings, that have been considered together with an analysis of the variations in impacts, as described in Section A.6, under these alternative Project configurations, including the criteria and reasons for selection of the Preferred Project;

A.9 Residual Impacts and Monitoring

- a review of all residual impacts that would not be mitigated or enhanced and proposals for on-going monitoring;

A.10 Conclusions

- a summary of the principal findings and conclusions of all studies which led to the application for the Slave River Hydro Project.

PART B TECHNICAL INFORMATION REQUIREMENTS

B.1 Need for the Project

The Applicant should present its arguments about the need for the Project relative to the expected growth in demand for electricity from the Alberta interconnected electric system and the role of the Project in meeting that demand.

Information to be provided should include, but not necessarily be limited to, the following.

- a detailed description of the basis for the expected energy and peak demand and the methodology used to project the growth in demand;
- the degree of uncertainty in the forecasts of energy and peak demand and the basis of alternative forecast which have been used in any economic analyses;
- consideration of the possibility that a widespread application of existing and "alternative" generation supply technologies in small dispersed facilities would result in a substantial reduction of demand from the Alberta interconnected electric system;
- a discussion of the capability of the existing or committed generating facilities and a description of the sequence of new generation additions, including the Project, required to meet the expected load demand;
- a description of the role of the Project in the Alberta electric system, the disposition of the expected energy production and the impact of the Project upon the evolution of the system as a whole.

B.2 Project Description

The Applicant shall provide a comprehensive description of the Preferred Project. If more than one alternative is submitted for consideration, each shall be described generally to the same degree of detail.

B.2.1 The Hydroelectric Facilities

Information requirements include, but may not necessarily be limited to, the following:

- maps and plans showing the locations of all permanent and temporary Project facilities including dams, power plants, reservoirs, control structures, transmission lines, sub-stations, access roads, borrow areas, camps and material depots;
- engineering plans in sufficient detail to show all features of the Project displaying key dimensions and elevations;
- commissioning dates proposed for each generating unit, any provision for future extensions, and a development schedule that demonstrates when construction activities must commence to meet the stated commissioning requirements;
- a detailed technical presentation to justify the choice of the turbine/generation machinery proposed including unit type and size in relation to the total installation;
- a technical description of other major equipment items such as powerhouse cranes, intake and tailrace gates, stoplogs, spillway gates and their operating equipment;
- a detailed description of the damsite geology and the investigations carried out to facilitate layout and design of the component structures;
- a detailed description of the investigations carried out to locate construction materials and an analysis of the choices made for construction of the various Project components;
- a detailed description of the investigations carried out in support of the study of structural stability, potential seepage and leakage problems, groundwater movements in the area between Fitzgerald and immediately upstream of the main dam (including the potential for seepage into the Salt River valley), abutment stability both above and below the damsite together with all relevant conclusions reached from these studies;
- a comprehensive description of the hydrological studies carried out to determine the full range of Project flows and energy outputs, the Project design flood and its passage through the Project area and the operating effects upon all upstream water levels affected by the Project during each season of the year;

The description should include the existing hydrologic and hydrometerologic data base, an assessment of its adequacy and the imputed or inferred accuracy of any derived information.

- a detailed description of all physical or mathematical models, including their calibration, used to either interpret the available hydrologic data or to predict the implications of the Project on the existing hydrologic or hydraulic regime;

- if a Project proposal provides for changes to the existing regimes in Lake Athabasca and to the Peace-Athabasca delta, a detailed description shall be provided of the overall, seasonal, monthly and short-period changes to flows and water levels that would be anticipated in these water bodies together with a clear statement of any operating criteria that would have to be observed, for example, in the case of a gated control structure, to protect the intended economic benefits of the Project;

- a construction schedule and plan to describe all aspects of the pre-construction and construction phases including the manner in which the river will be diverted around the construction activities during each stage of the work;

- a description of the power plant operating criteria proposed together with a discussion of the reasons for any assumed operating constraints;

- a discussion of the proposed schedule of filling the Project reservoir including a description of the factors which were taken into account in the development of the proposed schedule;

- a detailed hydraulic analysis of the effect of the Project upon sediment and bed load movement in the Peace-Athabasca-Slave system including an estimate of the rates and locations of sediment retention in the reservoir;

- a detailed hydraulic analysis of the short and long-term water level variations within the reservoir reach as a consequence of the natural inflow, any controlled inflows that may be affected and the imposed plant operating regime;

- an analysis of ice formation and movement in the reservoir reach with particular reference to any changes to the existing regimes that may be anticipated in the lower Peace River, Lake Athabasca and the Peace-Athabasca delta;

- a comprehensive analysis of open-water and ice-covered river level and flow conditions that will be anticipated downstream of the hydroelectric station as a consequence of operating the turbines, including both short-period (daily/weekly) and seasonal variations, paying particular attention to the nature and extent of regime changes at locations of environmental concern;

- an analysis of the new sediment and flood flow regimes and the river morphology downstream of the generating station;

- an analysis of any short-term, seasonal and over-year changes that will be anticipated within the Great Slave Lake and MacKenzie River system by virtue of the routine operation of the Project;

- a presentation concerning all aspects of transportation relating to construction and operation of the Project including new or improved access routes, their construction and post-construction abandonment or ongoing maintenance;

- a description of the intended power station facilities as these relate to generation control, equipment protection, station service, reliability, maintenance and communications;

- a description of the manner in which the safety and integrity of the Project would be assured in the event of major floods with particular reference to emergency conditions such as an interruption in the transmission to the Alberta electric system;

- a description of the switchyard with suitable drawings;

- a description of existing facilities such as transmission lines, roads, water supply intakes, etc., which might be affected by the Project and their proposed rehabilitation;

- a detailed analysis of labour force needs for the Proect construction and operating phases together with an estimate of accommodation requirements;

- a description and layout of the construction personnel accommodation arrangements proposed including relevant discussion on the services to be provided and any conditions to be imposed to constrain access and freedom of movements by construction personnel.

B.2.2 The Transmission System

The specific requirements for the transmission are described in ERCB Guide G-22 "Guidelines respecting an Application to Construct or Alter an Electric Transmission Line".

The technical information to be provided for the transmission system required to interconnect the Project shall at least include the following:

- a detailed technical presentation to justify the choice of transmission system proposed including type of transmission, the number of circuits, the voltage level, the number of switching and step-down stations, the type of compensation devices and the fault clearing requirements;

- a detailed technical presentation to demonstrate that the proposed transmission system will be a viable part of the Alberta interconnected electric system from the date of commissioning through to a selected future year;

  This presentation should deal with the Project's impacts on the reliability of the system as well as on that of the Project.

- maps and plans showing the locations of all facilities between the hydro power plant and a point south of Lake Athabasca or the Peace-Athabasca delta;

- engineering drawings and plans of all transmission system facilities in the Project area including towers and sub-stations with special attention to any proposed crossing of Lake Athabasca or the Peace-Athabasca delta.

B.3 Economic and Financial Evaluation

The Applicant shall include in the economic and financial evaluation all those costs and benefits which can be reasonably measured in dollars and shall describe costs and benefits which cannot be measured in dollars. Under this section, the guidelines refer to economic costs and benefits in the Alberta electric system and in the provincial, regional and national economies. Socio-economic considerations in the Project area are referred to in Section C.2.3.

The presentation of the economic evaluations should discuss all costs and benefits which accrue within a particular economic unit, that is to say, the Alberta electric system, the Project area, the Province of Alberta, the Province of Saskatchewan, the Northwest Territories and the rest of Canada, irrespective of financial transfer payments within the economic unit. Since general price escalation of inflation affects transfer payments between economic units, consideration should be given to the use of constant prices of an appropriate base year in all economic analyses.

The financial analyses should be limited to Project financing and the implications thereof within the Alberta electric system. Alternative inflation scenarios and interest rates should be considered.

B.3.1 The Alberta Interconnected Electric System

- a description of all capital and operating costs for the project and likely alternatives including an estimation of the benefits accruing within the power sector of Alberta with a detailed exposition and discussion of assumptions, values of significant parameters, planning and other decision criteria;
- the presentation of the new benefits of the project, in comparison to likely alternative projects, on the basis of a minimum bulk supply system analysis; the presentation of net system costs and of levelized cost per kwh over the life of the proposed hydro project between the system with the proposed Project and the system without the proposed Project, incorporating likely alternative projects, under comparable system performance characteristics;
- the presentation of net benefits shall also include appropriate sensitivity analyses to alternative assumptions and parameter values which significantly affect the results of comparative analyses.

B.3.2 Regional, Provincial and National Economic Impact

- an analysis of costs and benefits accruing to the province of Alberta due to construction and operation of the Project, not incorporated in the analysis of the Alberta electric system; costs and benefits will refer to direct, indirect and induced economic effects in terms of gross provincial product or a similar indicator. Effects on employment, income and population must also be considered in the context of expected economic activities in the province and of expected resource availability. The cost and benefit analyses should also include detailed consideration of employment and business opportunities arising from the Project in Alberta.
- an analysis of costs and benefits accruing to the Northwest Territories and Saskatchewan, either as direct, indirect or induced effects due to construction and operation of the Project or as a result of possible power supply from the Project to these regions;
- a similar analysis with respect to the Project area region, irrespective of provincial boundaries;
- an analysis of costs and benefits accruing to the rest of Canada;

B.3.3 Financial Considerations

- a description of one or more likely Project financing scenarios based on proposed institutional arrangements;

- an analysis of the financial impact of Project implementation on the financial health of the Applicant(s) and on the cost of supply in the Alberta electric system, under alternative financial assumptions;

  The cost of supply should be expressd as the average bulk supply cost per kilowatt for each year of the analysis, as well as the levelized cost of the period of analysis, for similar conditions as assumed in the economic analyses.

- a sensitivity analysis to assumptions and parameter values which significantly affect the results of the analyses.

PART C THE ENVIRONMENTAL IMPACT ASSESSMENT

An Environmental Impact Assessment (EIA) is required for the Project to facilitate a comprehensive environmental and social review. The EIA must address the physical, biological and social aspects of the environment within their relevant impact areas and address separately the construction and operational phases of the Project. The Applicant should also clearly identify the impacts of the transmission system. The EIA should describe the extent to which impacts of all types will be mitigated by planning, project design, construction techniques and operational constaints. In C.3, the need for specific additional mitigation and enhancement proposals is described.

The Applicant should define an impact ranking system and classify all impacts according to that system in a consistent manner. Of greater importance is the choice of impact components to be ranked. As noted in Part C.1, ecological systems rather than only individual physical and biological parameters should be evaluated from the Project impact viewpoint. Thus, for example, if a particular local habitat preferred by an important species of wildlife is considered to be adversely impacted, the impact rating should recognize the habitat location with reference to nearby alternatives and the degree of preference shown for that habitat by comparison with available alternatives. The possible synergistic effects of primary impact parameters upon the local ecosystem should also be considered. Attention should also be paid to project impacts that are likely to worsen over time. The extent and significance of important data deficiencies, where these affect the reliability of impact predictions should be identified.

A section of the EIA should deal with the issue of Project abandonment. The presentation should describe any design features of the Project facilities that would facilitate their removal or abandonment in place.

C.1 The Project Area

This section describes the background information that the Applicant shall provide to support the Project selection, design and operating proposals as well as the environmental and socio-economic impact assessments. The descriptions shall be sufficient not only to provide the basis for impact assessment of the Preferred Project and the transmission route but also to provide the basis for assessment of alternatives which have been rejected by the Applicant.

The Project Area, as defined in 1.3, includes all those portions of land, water and air that are likely to be affected by the Project. Not all sections of the Project area need to be described to the same degree of detail. Land and water areas to be directly affected by construction, flooding or Project operation should be described more fully with mapping generally at a scale in the range 1:10,000 to 1:50,000, whereas areas indirectly impacted may be mapped at scales in the range 1:50,000 to 1:250,000.

C.1.1 The Physical Environment

The description of the existing physical environment shall focus on all aspects that are relevant to the assessment of impacts and mitigation issues. The area described should be broad enough to encompass issues which might be relevant to the preliminary assessment of alternative Project configurations including transmission routes which the Applicant has considered and rejected in favour of the Preferred Project. Without limiting the generality of the foregoing, the following aspects should be included:

- the general physiography of the MacKenzie River Basin and the Slave River Basin in particular;
- the climatic characteristics of the MacKenzie River Basin, with particular reference to the Project area;
- the bedrock and surfical geology of the Project area;
- the soils classifications of the Project area;
- particular features that may be susceptible to significant modification such as landforms, areas of permafrost, karst features and intended borrow areas;
- the hydrologic characteristics of the MacKenzie Basin including mean and extremes of surface water discharges, the level ranges of all major lakes, the impacts of existing and proposed flow control facilities (notably the Bennett Dam and other Peace River Projects), and the implications of any established or proposed water management agreements;
- the existing hydrology including statistcal analyses of river flow and lake level regime including Lake Athabasca if it is part of the project area, sediment concentrations, ice regimes, and the flow regulation effects of Williston Lake and the rockfill weirs in the Peace-Athabasca delta on the rivers and lakes of the Peace-Athabasca-Slave system;
- the general groundwater regimes in the Project area;
- all existing water uses in the Project area including any identified existing "in-stream" requirements; and

- a description of the Peace-Slave River valley within the Project area with particular attention to the valley bottom, abutments, immediately adjacent uplands and potential transmission rights-of-way, bank stability, local and regional groundwater movements, tributary creeks, and areas of potential Project construction materials.

C.1.2 The Biological Environment

The biological environment of the Project area should be described in a manner that facilitates both an assessment of specific quantitative components and an understanding of the existing ecosystems. Without limiting the generality of the foregoing, the following aspects should be addressed:

C.1.2.1 Aquatic Environment

- the seasonal variations of water quality in the major lakes and rivers including water temperatures, water chemistry (turbidity, dissolved oxygen, heavy metals, pollutants), nutrients and assimilative capacity;
- the aquatic biology of the Project area including species composition, distribution and diversity;
- the overall productivity in the existing aquatic environment;
- the identification of important/critical spawning and rearing areas for all major fish species;
- the spawning and migration habits of all major fish species, both anadromous and freshwater;
- the identification of any rare or endangered fish species;
- the aquatic invertebrate composition;
- the occurrence and distribution of the lamprey eel;
- the past and present commercial, domestic and recreational fisheries;

C.1.2.2 Terrestrial Environment

- the use of the Project area by fauna of all types likely to be affected by a Project with particular reference to furbearers, ungulates and waterfowl and to rare, endangered or unique species;

The seasonal distributions, species composition and diversity should be described including, important/critical seasonal habitat requirements and the nesting, staging and flight path areas utilized by migrating waterfowl and other species including whooping cranes;

- the types and extent of vegetative cover, relating each type and extent to soil characteristics and hydraulic regime as well as to wildlife habitat preferences; and
- the peculiar characteristics of the saline ecosystem in the Salt River area.
- the peculiar characteristics of the Athabasca sand dune ecosystem if surface and groundwater levels in and around Lake Athabasca are to be affected.

C.1.3 The Socio-economic Environment

The existing socio-economic environment within the Project area should be described in sufficient detail to form the basis for the impact assessment and all mitigation proposals. Projections of future conditions refer to the condition without this Project and should cover a period of sufficient time for the impacts of the pre-construction, construction and operational phases of the Project to have stabilized. Without limiting the generality of the foregoing, aspects to be addressed should include:

C.1.3.1 Population

- the total population by community and dispersed population;
- the composition by age, sex, education, ethnic origin;
- a projection of population growth;

C.1.3.2 Economic Activity and Resource Use

- the current economic activity, and recent trends thereof, by community or sub-area and by economic sector;

  Economic activity shall include commercial activity and subsistence activity. Whenever possible, quantitative estimates of production, sales or value-added shall be given.

- the current use, and recent trends thereof, of physical and biological resources as related to the economic activities described;
- projections of economic activity and resource use;

C.1.3.3 Employment

- the labour force, employment and unemployment, and recent trends thereof, by economic sector, community or sub-area, age, sex, ethnic origin, wage level, skill and level of education;
- projections of future conditions;

C.1.3.4 Community Infra-structure and Services

- the existing facilities and services by community or sub-area;

  Facilities and services to be included are: housing, transport (including winter roads), power, communications, water and sanitation, education, training, health care, recreation, welfare and family services, police and fire-fighting services.

- the municipal finances in those cases where the Project might have an effect on municipal finances;
- plans and requirements for expansion of infra-structure and services for the situation without this Project;

C.1.3.5 Social and Cultural Patterns

- the social and cultural patterns, life styles, attitudes, perceptions and expectations with emphasis on those characteristics which are relevant to Project execution and impact analysis, by community or sub-area;
- where relevant, projections of future developments of these characteristics without this Project;
- a description of expectations, attitudes and perceptions with regard to the Project by community or sub-area and by defineable social or economic groups;

C.1.3.6 Land and Surface Water Use

- a description of existing land use, by community or sub-area, for residential, industrial, commercial, institutional, transportation and recreational purposes;
- the availability of (serviced) land for these purposes, now and in the future;
- a description of existing resources for special purposes or special groups including land under grazing rights, mineral claims, cutting rights, trapping licenses, water rights (including any existing hydro projects in the Project area), native reserves, national parks, ecological reserves, game reserves and recreational areas;
- a description of navigational use of navigable waters in the Project area including the identification of any aids to navigation, docking facilities, etc.

C.1.3.7 Historical Resources

- an inventory and description of archaeological and historical resources in the Project area. The Applicant should seek guidance from Alberta Culture and, if necessary, Saskatchewan Culture and Recreation regarding specific requirements in this area with respect to surveys, analyses and possible mitigation.

C.2 Environmental and Socio-Economic Impact Information Requirements

C.2.1 The Physical Environment

Issues relating to the physical impacts of the Project are dealt with in terms of the technical integrity of the facilities in B.2. In this section, all impacts to the physical environment should be described with a view to their ecological and socio-economic implications. Aspects to be addressed should include:

C.2.1.1 Geology

- the implications for reservoir integrity imposed by the existing (or modified) foundation conditions with particular reference to the presence of Karst topography;

- anticipated changes in the hydrogeology of the area close to the river by virtue of the impoundment and its operation;
- the potential for increased subsurface water migration into the Salt River basin including an identification of any changes that would occur in the groundwater chemistry;
- the potential for increased subsurface water migration into the Athabasca sand dunes;
- measures considered necessary to control seepage from the reservoir;
- bedrock stability changes;
- disturbances to the surficial geology caused by the construction of access roads and transmission rights-of-way, the recovery of construction materials, site development and post-construction site clean-up;
- impacts upon permafrost during the construction phase and of a long-term nature during Project operation;
- changes to bank stability both along the reservoir and downstream of the main dam on the Slave;
- increased potentials for erosion and slumping of landforms at all phases of Project implementation with particular reference to stream crossings along the transmission right-of-way and, if applicable, the Lake Athabasca shore line;
- mineral resources;

C.2.1.2 Air Quality and Climate

- construction activities likely to produce significant changes to the ambient air quality in the immediate area such as dust, waste disposal, wood burning and increased incidence of fires;
- noise levels near the power plant and along the transmission line associated with both construction and operation phases;
- micro-climatic changes caused by Project construction and operation including precipitation patterns, river ice-cover conditions, inluding freeze-up and break-up dates, evaporation rates, fog and ice-fog conditions and wind effects;

C.2.1.3 Hydrology and Water Use

- any changes in the hydraulic/hydrologic characteristics due to Project construction and operation such as effects on external and 'in-stream' water uses, altered flood conditions, modified ice regimes, lake levels, river flows and areas to be flooded;

C.2.1.4 Water Quality

- changes to the quality of water in the groundwaters, lakes and rivers of the Project area imposed during construction including increased sedimentation, disposal of sanitary wastes, fuels, chemicals, lubricants, herbicides and pesticides, solid wastes, modified ice and flow regimes and reservoir and transmission line right-of-way clearing;

- impacts upon water quality in the groundwaters, lakes and rivers of the Project area imposed by Project operations, including the effects of all proposed flow regime control facilities, such as effects of impoundment on water chemistry and assimilative capacity both within the reservoir and downstream of the damsite, water temperature modifications, changes in dissolved oxygen concentrations, leaching of heavy metals, nitrogen supersaturation below the main dam, altered sediment regimes, thermal stratificaion and increased eutrophication potentials.

C.2.2 The Biological Environment

Aspects of the biological environment to be addressed should include:

C.2.2.1 The Aquatic Environment

- tolerances to the effects of changed seasonal and short-term physical and water quality conditions during both the construction and operation phases for all important anadromous and freshwater fish species both in the Peace-Athabasca-Slave river systems and in streams crossed by the transmission line, with respect to their life-cycle activities (migration patterns, habitats for spawning and rearing and availability of food) and species diversity;

- fish habitat changes and food chain impacts as a consequence of the construction and operating phases;

- potentials for modification to species composition and diversity such as the introduction of new species, fish parasites and/or diseases into the upper Slave River;
- the significance of changes in the aquatic environment both in the Peace-Athabasca-Slave river systems and in streams crossed by the transmission line to the habitat, food availability and abundance of aquatic animals, particularly muskrat and beaver;
- modifications to any of the defined aquatic environment impacts that would be anticipated if significant changes to the hydrology occurred such as diversions into or out of the upstream tributaries and/or additional regulating facilities;

C.2.2.2 The Terrestrial Environment

- mapping and areal estimates of all terrestrial habitat gains and losses;
- the potential for change to the saline ecosystem of the Salt River area as a consequence of seepage from the Project reservoir;
- the potential for and significance of impacts on the Athabasca sand dune ecosystem as a consequence of possible changes to groundwater hydrology caused by project induced variations in Lake Athabasca water levels;
- the significance of surface and sub-surface disturbances caused by the construction phase in terms related to wildlife habitat, rare or endangered plant and animal species, aesthetic considerations, groundwater conditions and erosion potentials;
- the development of new riverine environments along the peripheries of the reservoir and the ecological significance of these environments in terms of the hydrologic regimes imposed by any seasonal operating criteria;
- the impacts upon the floodplain environment below the main dam as a consequence of Project operations and the significance of these impacts in terms of riverine usage, vegetation communities and wildlife habitat modification;

- the effects of the Project construction and operating phases upon terrestrial wildlife habitats throughout the Project area paying particular attention to impacts that would affect bison migration patterns, the potential spread of anthrax spores, the abundance of furbearing species of importance to the local economies and culture preferences;
- the effects of the clearing, construction in and maintenance of the transmission line right-of-way upon terrestial wildlife habitats;
- the effects of construction, impoundment and operations upon the nesting and staging areas for waterfowl that are important throughout the Project area;
- the effects of the proposed Project facilities, and particularly the transmission system, upon migrating birds in the Project area;
- the effect of the Project construction and operating phases upon species that are rare or endangered;
- the effects of increased accessibility due to the transmission right-of-way and human activity during all Project development phases upon the flora and fauna throughout the Project area.

C.2.3 Socio-Economic Envionment

In the EIA, the Applicant shall describe impacts caused by the Project on the existing socio-economic structure. Where possible, all costs and benefits arising out of the impacts should be quantified and attributed to the recipient groups or sub-groups of people. The impact analysis must be used subsequently to rank impacts according to significance and to formulate mitigation and enhancement proposals.

Areas requiring particular attention are:

- the impact on tradional resource based activities such as hunting, trapping, and fishing;
- the requirement for re-location of people and dislocation of economic activities;
- the impact on infra-structural and service facilities in the Project area including need for temporary or permanent expansion solely due to Project implementation and an estimate of the cost of such additional expansion;

- the impact on municipal finances of affected communities, the need to adopt special measures and the nature of those measures;

- the impacts on land use and on requirements for serviced land and the associated costs;

- the impacts on social and cultural characteristics and patterns in affected communities;

- the impact on the proposed arrangements regarding temporary housing of construction and associated workers with special reference to the degree of isolation or integration and the level of self-sufficiency of construction camps;

- the indirect impacts of construction activities as a result of generated traffic, noise, dust, waste disposal and recreational activities of temporary residents;

- the impacts on special interest and other identifiable sub-groups of the Project area population and of associated issues;

- the impact on special sub-areas associated with restricted land use such as the Wood Buffalo National Park, game reserves, native reserves, mineral claims and other areas under special rights;

- an assessment of direct employment opportunities for Project area residents during construction and operation, considering detailed requirements by skill and training, availability of labour, training requirements and the possible impact of union hiring rules;

- a similar assessment of indirect employment opportunities in the Project area;

- an assessment of direct and indirect business opportunities including tourism, during the construction and operation phases, considering detailed requirements, existing business capabilities, training and supporting programs;

- an assessment of the impact on existing employment and business in the Project area as a result of the additional opportunities arising from Project implementation including an assessment of the possible effect of higher wages payable for Project related work.

C.3 Mitigation, Enhancement and Monitoring

A separate section of the EIA should describe specifically, the manner in which the Applicant proposes to mitigate perceived impacts, as well as any opportunities that are recognized for enhancement of effects deemed beneficial. Issues relating to the transmission system should be clearly identified. Proposals for monitoring the construction and operating phases to ensure satisfactory performance in accordance with the mitigation and enhancement proposals should also be described. Cost estimates should be provided for any mitigation proposals not considered to be an integral part of the Project construction cost and suggestions should be made concerning the financing of such expenditures.

C.3.1 Mitigation and Enhancement of the Physical and Biological Environment

Particular aspects to be considered with reference to the construction phase should include:

- measures that will be taken to minimize adverse impacts caused by the borrowing, use and placement of construction materials, noise and dust pollution in and close to inhabited areas, waste disposal from all construction and accommodation areas, the development of access roads to all borrow and construction locations, and the need to relocate people and facilities affected by the Project;
- measures that will be taken to stabilize all disturbed areas, including areas along the transmission route, and return them, where practical, to productive use after construction has been completed;
- special measures that will be adopted to avoid or, if necessary, reclaim and stabilize, sensitive areas by virtue of the existence of permafrost, unstable landforms or rare or endangered species of flora and fauna;
- measures that will be taken to avoid unwanted seepage from the reservoir into groundwater aquifers and the Salt River basin; and
- measures that will be taken to relocate and protect wildlife threatened by transmission route clearing, Project construction and reservoir impoundment.

Particular aspects to be considered with reference to the operational phase should include:

- operating constraints that will be adopted to reduce the potential impacts upon the downstream riverine environment and any identified riparian or river uses;

- measures that will be adopted to control public access to ecologically-sensitive areas, particularly along the transmission right-of-way, and to moderate over-exploitation of the natural resources of the Project area;
- measures that will be taken to deal with any losses of resource uses by the local people such as property located in inundated or cleared areas, traplines affected by flooding and reductions in hunting potentials and fishing opportunities;
- opportunities that exist for habitat enhancement, both terrestrial and aquatic, including a discussion of any trade-offs that may be possible between species or different parts of the Project area.

C.3.2 Mitigation and Enhancement of the Socio-Economic Environment

Particular aspects to be considered should include:

- measures that will be taken to enhance the employment and business opportunities for Project area residents and the people of Alberta;
- measures that will be taken to minimize the adverse impacts of the construction activities and the influx of large numbers of construction workers upon the local communities;
- proposals and recommendations to provide financial assistance for Project area communities to meet the needs for increased services and infrastructure.

The Applicant should define the intended responsibilities for all mitigation and enhancement proposals with particular reference to those of government, municipal, community and private organizations not under its control. Recommendations should be provided concerning any institutional arrangements that may be needed to support and enforce mitigation and enhancement proposals, and should make special note of any legislative changes.

C.3.3 Residual Adverse Impacts

The Applicant should identify and assess the impacts, effects and implications which are likely to remain after mitigation or which are not proposed to be subject to mitigation.

C.3.4 Monitoring Proposals

The Applicant should submit specific proposals for Project mitigation and enhancement monitoring programs. Such programs may also include the monitoring of residual adverse impacts, particularly when the nature and size of the impact is considered to be uncertain. Monitoring programs shall cover both the construction and operational periods. Proposals shall discuss the methodology of measurement, quality control, use of baseline information and reporting relationships. Responsibilities for program execution shall be identified and the estimated costs provided.

PART D PROJECT ALTERNATIVES AND SENSITIVITY ANALYSES

The Applicant should substantiate both its choice of the Slave River Hydro Project among alternative sources of electric energy supply and of its Preferred Project among alternative configurations.

D.1 Alternatives to the Project

The selection of the Slave River Hydro Project should be discussed in the context of a comparative cost analysis as part of the generation planning procedures of the Alberta electric system. The Applicant shall describe the methodology used to select the Preferred Project from amongst the alternative configurations of a Slave River Hydro Project. The comparative analyses should include:

- consideration of the conceivable competing sources of supply including large scale application of possible new and "alternative" technologies;
- an assessment of the Slave River Hydro project in comparison to these alternatives in the light of relevant economic, financial, technical, environmental and social considerations during construction and operation. The comparisons should be made on the basis of the delivered cost of power from the Project and the cost for an equivalent amount supplied from other sources.

D.2 Sensitivity Analyses

The Applicant should demonstrate the appropriateness of the selection of the Preferred Project, including its time of introduction, by undertaking extensive sensitivity analyses to assumptions and factors which are beyond its control and to values which are difficult to estimate. These analyses should be applied to the Project and its competing generation sequence included in the generation planning analyses and shall include, but not necessarily be limited to, the following factors:

- construction cost variations (in constant prices) due to Project completion delays and variations of major cost elements, including the cost of labour;
- variations in all relevant fuel prices (in constant prices);
- alternative discount rates, interest rates and rates of future inflation;
- alternative financing schemes;

- alternative load forecasts including consideration of recent forecasts prepared by others;
- likely or possible future modifications of constraints on operations such as regulations regarding reservoir drawdown and downstream releases;
- possible modifications of the inflow regime during the life of the Project due to upstream developments;
- variations in imposed costs as a consequence of those environmental and social impacts, the quantification of which are deemed uncertain and potentially significant.

D.3 Alternative Construction and Maintenance Methods

The Applicant should discuss the selection of the proposed construction plans and methods from amongst the possible alternative methods and identify the criteria used in the selection, particularly with regard to social and environmental impacts. The discussion should include, but not necessarily be limited to the following:

- river diversion;
- borrow sites and temporary access roads and their restitution;
- waste disposal and the control of all materials entering the water course during construction;
- reservoir clearing;
- placement of transmission towers;
- crossing of streams;
- maintenance of transmission right-of-way;
- use of local labour.

D.4 Alternative Project Configurations

The Applicant should present the case for the selection of its Preferred Project considering relevant technical, economic, social, environmental and administrative implications of possible Project variations. The presentation must include an explicit discussion of the methodology used to assess the different types of implications, quantitatively or qualitatively, as the case may be.

PART E SUMMARY AND CONCLUSIONS

The Applicant should provide, as part of its submission, a section in which the findings and individual conclusions arising out of all the studies carried out in support of its choice of the Project and of this application are synthesized and summarized. The summary should address, but not necessarily be limited to, the following issues:

- the need for new generation;
- the selection of the Project from among alternative sources of electric supply;
- the choice of the Project from among alternative hydroelectric projects which could be developed on the Slave River and the extent to which the Project exploits the potential of the hydroelectric energy resource;
- the economic and financial considerations;
- the environmental considerations;
- the socio-economic considerations; and
- the considerations used in the development of the proposed mitigation, enhancement and monitoring proposals.

PART 2

INTERIM GUIDELINES FOR THE PREPARATION OF AN ENVIRONMENTAL IMPACT STATEMENT FOR A PROPOSED SLAVE RIVER HYDROELECTRIC POWER DEVELOPMENT

PREPARED BY THE
SLAVE RIVER HYDRO
ENVIRONMENTAL ASSESSMENT PANEL
OTTAWA

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GOVERNMENT CONTACT

For more information about Part 2 of these guidelines please contact the following:

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1. INTRODUCTION

The Environmental Assessment and Review Process (EARP) of the Government of Canada requires that proposed projects, programs and activities, involving Federal government funds or property, and which are likely to have significant environmental effects, be submitted to an Environmental Assessment Panel for review. This is to ensure that a project is assessed early in its planning and before any decision is made to proceed. The Panel is formed under the authority of the Minister of the Environment and it reviews an Environmental Impact Statement (EIS) and other relevant documents prepared by the Proponent company or government undertaking the project. An important feature of the review is the provision for briefs by technical agencies and by public groups and individuals wishing to comment on the EIS.

Parks Canada referred the Slave River Project to the Minister of the Environment in January, 1980 for a Panel review under EARP because Wood Buffalo National Park land could be lost due to flooding. At that time Parks Canada identified concerns about the alteration of water levels in the Peace-Athabasca Delta, flooding in the Slave River Valley behind a proposed control structure (dam), and the effects of transmission lines and associated maintenance roads on whooping cranes and their habitat. Other areas of federal interest in the project relate to concerns about fisheries and migratory bird impacts, downstream effects in the Northwest Territories, traditional land use, and the effects of possible transmission of power to the Northwest Territories (N.W.T.).

This section of the Guidelines has been prepared by the Slave River Hydro Environmental Assessment Panel. It reflects information submitted to the Panel at Draft Guideline meetings in October and November 1982. The Panel's Guidelines are being issued at this time in conjunction with the Government of Alberta Guidelines to provide direction to future Proponents and those carrying out Project-related studies on matters upon which the Panel will be seeking information related to its mandate. At a future date it is anticipated that a more co-ordinated Master Information Requirement Document will be prepared jointly by all jurisdictions having an interest in the Project. This section will form the basis of the Panel's component that of that Document.

The Proponent has the responsibility to observe the intent of these guidelines, and to identify and describe all environmental and socio-economic impacts likely to arise from the Project even for those not explicitly identified in these Guidelines. Since this document has been prepared prior to a proponent being named or a specific proposal defined, it may include matters which the Proponent does not consider to be relevant or significant to the Project or to the study area. This should be indicated in the EIS. Government agencies and the public may wish to comment on this subject during the review. If the Panel disagrees with the Proponent's assessment of relevance it may require additional information from the Proponent before proceeding with the review.

When the EIS is completed by the Proponent, it will be reviewed by the Panel and made available for review and comment by government agencies and the public. Public meetings will then be called by the Panel so that interested parties can present their views on the environmental and related socio-economic aspects of the proposed Project. It is expected that representatives of the Proponent will attend these meetings to answer questions on the EIS.

The review of the EIS and related public hearings will provide the Panel with the information base necessary to prepare its report to the federal Minister of Environment.

2.0 SCOPE OF THE PROJECT REVIEW

The panel understands that a thorough public review of all aspects of the project, including need and alternatives, will be undertaken by the Alberta Energy Resources Conservation Board which will make recommendations to the Government of Alberta. Information on project need and alternatives filed with the Alberta Energy Resources Conservation Board by the proponent as part of their application will be made public and available to the Environmental Assessment Panel in order to put the environmental and socio-economic review in context.

The Panel review will be on matters of federal and territorial responsibility, specifically: potential effects on Indian people, on the integrity of Wood Buffalo National Park, and on the environment and people of the Northwest Territories. In particular, the review will cover environmental and related socio-economic concerns of Indian people, the water regime of Wood Buffalo National park, including ground water, potential park boundary amendments, impacts on the physical, floral and faunal resources protected within Wood Buffalo National park and adjacent areas in the Northwest Territories, and effects on rivers and deltas both in the park and downstream of the dam, including potential impacts on Canada's national and international trans-boundary interests in migratory birds.

The Panel's Interim Guidelines should be read with this scope of activity in mind and with the application of the stated requirements applying to areas of federal responsibility.

3.0 PREPARATION OF THE ENVIRONMENTAL IMPACT STATEMENT (EIS) AND SUMMARY DOCUMENT

The Proponent will be responsible for the preparation of an EIS with sufficient copies for review by the Panel, government agencies and the public. It is expected that the EIS will receive wide distribution and should be easily available to interested parties. The specific number of copies required shall depend upon anticipated demand and will be determined at the time of printing.

SUMMARY VOLUME

A summary of the EIS should be prepared as a document for wide distribution by the Panel Secretariat. The summary should allow a reader to obtain both a concise view of the EIS contents and to focus on items of specific interest. It should be written in non-technical language and presented in a format that can be used by the public, extracted directly for publication by the news media or used by individuals requiring a prompt appraisal of the situation. Information in the summary should be keyed to sections of the main report. The summary of the EIS should include:

a) a brief description of the preferred Slave River Hydroelectric Project proposal, and its proposed location, including transmission lines, in text and map form;

b) a brief explanation of why the Project is being proposed;

c) a concise evaluation of all alternatives considered, including capital and operating costs;

d) a concise summary of the major natural environmental, social and economic conditions in the area that may affect or be affected by the Project;

e) a description of the probable major environmental and social impacts, the mitigation measures to be implemented, and a statement on the significance of any unmitigated residual effects;

f) a summary of any other expected impacts should be provided and any limitations in the EIS created by information deficiencies should be identified;

g) a description of the on-going monitoring program proposed.

4.0 THE CONTENTS OF THE ENVIRONMENTAL IMPACT STATEMENT

INTRODUCTION

The EIS should be organized to accommodate a broad public review by both lay readers and specialists. Detailed scientific and technical information, reports and documents upon which key conclusions are based should be cited and made available to specialist reviewers.

The EIS should contain:

a) An Overview which captures, in brief, the possible environmental and related socio-economic effects of the proposal and the efforts that will be made to enhance the desirable effects and to avoid or mitigate adverse effects;

b) Background information on the proposal including a rationale for the Project, possible alternatives and a description of the proposal during all phases of construction and operation;

c) Baseline description of the existing environment including physical, biological and socio-economic parameters. In this section emphasis should be placed on those features and processes likely to affect and be affected significantly by the proposed development;

d) Impact analysis should be the focus of the EIS. It should include an analysis of significant issues, impact predictions, mitigation and compensation measures, monitoring and research deficiencies and needs;

e) Summary information published in a separate document as described in section 3.0.

4.1 ELECTRICITY DEMAND, PROJECT ALTERNATIVES, AND ASSOCIATED PROJECTS

The purpose of this section is to describe the objectives of the project. The panel recognizes that it will not be making recommendations in its report about electricity demand, or project need and alternatives. However, in order to provide a context for the review and to enable the panel to develop an understanding of the comparative importance of any potential environmental impacts of the project, it is seeking an explanation of these aspects in the EIS. The more comprehensive the descriptions of need, alternatives and demands projections, the better position the panel will be in to put forward balanced recommendations on the environmental issues.

4.1.1 Project Plan Alternatives

If alternative plans are developed for the Project including transmission facilities, the Proponent should provide a description and environmental analysis of each plan. The discussion of alternatives should give sufficient detail to permit the reviewer to compare the costs, benefits, environmental risks, and the social and economic impact of each. The criteria for and method of selecting the preferred alternative over other options should be discussed especially where the alternatives would have significantly different impacts on the natural and socio-economic environment. If a Slave River dam alternative with a forebay elevation greater than 203 meters is proposed, the environmental implications of it should be compared with a dam configuration of forebay elevation of 203 meters and a gated control structure capable of regulating water levels in the Peace-Athabasca Delta.

The level of 203 meters has been selected for comparison with greater forebay elevations because it is assumed that levels greater than 203 meters would result in increased water levels in the Peace-Athabasca Delta.

The alternatives of not building the Project, postponement of the Project and one which would result in no impact on National Park lands should be considered in any discussion.

4.1.2 Associated Projects and Developments

Assess the potential cumulative environmental and social effects of the proposed Project and other existing or proposed developments in the Project Area including power projects to meet requirements in the southern Mackenzie and Great Slave Lake regions. This assessment should include the biophysical and socio-economic synergistic interactions with the other developments, including those projects over which the Proponent does not have control but which may interact with the Slave River Hydro proposal such as the possible dedication of an energy/transportation corridor. These should be included in the studies especially if the proposed Slave River Hydro Project will have the effect of stimulating or accelerating them. Likewise, if an all-weather road from Fort McMurray to Fort Chipewyan or Fort Smith, or an all-weather extension of Highway 58 from Fort Vermilion via Peace Point is considered essential to Project transportation requirements, then the related changes to lifestyles of affected communities should be discussed. An assessment should also be made of the potential impacts of new roads on Wood Buffalo National Park and on traditional, cultural, and social activities in the Project Area.

The Panel recognizes that it may be difficult for a Proponent to adequately address some of these examples and that governments (federal, provincial, and territorial) will have an important role in this review.

4.2 THE PROJECT PROPOSAL

This section should give a description of the preferred plan for the Slave River Hydroelectric Project and should cover the scope and layout of the project and the proposed schedule for development for both electrical production and transmission facilities.

4.2.1 General Layout

The EIS should include detailed, high resolution maps of the Project and the environment at the largest practical scale and contour interval showing the factors which have a bearing on the selection of the preferred plan and the alternatives. Transparent overlays would be particularly useful for certain resource mapping such as flood levels, wetlands, and wildlife habitat. The Ecological Land Survey Guidelines for Environmental Impact Analysis[1] should be considered for the purposes of this description with mapping to the ecosite level (Scale in the range of 1:50,000 to 1:10,000) where appropriate. Maps and diagrams should display the following information:

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[1] Environment Conservation Service Task Force. 1981. Ecological Land Survey Guidelines for Environmental Impact Analysis. Ecol. Land Classification Series No. 13. Lands Directorate, Environment Canada, Hull, Quebec, K1A 0E7. 42 pp.

a) all relevant geographic features;

b) the Peace-Athabasca and Slave River Deltas and low-lying areas adjacent to the Slave River;

c) existing and new access roads, trails and all-weather roads including bridges, culverts and other stream or lake crossings required for the preferred project plan and alternatives;

d) population centres, present land use, and existing or proposed developments and activities in the Project Area (e.g. Wood Buffalo National Park, historic sites, fishing camps, cabins, archaeological sites, traplines, timber and mining rights, and industrial developments, including oilsands projects). In particular, relate potential impacts of the Project to existing and proposed Indian reserves, claims, and rights connected with Treaty No. 8 and the Natural Resources Transfer Act of 1930;

e) all temporary and permanent, existing and proposed construction sites, Project workers' housing or campsites, borrow and waste disposal areas, water and fuel supply areas, and other ancillary facilities;

f) the location of the transmission corridor and of major flight paths of birds in relation to the corridor, areas where buried lines could be used, location of support facilities such as substations and diagrams of proposed tower designs and locations;

g) comparative maps of the proposed reservoir area(s) should be provided for all dam alternatives. Particular reference should be made to the Peace-Athabasca Delta, before and after reservoir filling. The locations of dykes, control dams, and proposed diversions should be noted;

h) the maximum and normal full reservoir storage level and the level of normal and maximum draw-down (e.g. operating level fluctuations) at an appropriate scale; include effects on Peace-Athabasca Delta and Lake Athabasca water levels.

Diagrams and descriptions of the proposed dam facilities should be provided including such items as dykes, spillways, coffer dams, power facilities, intake and discharge channels and structures, as well as those Project control structures which may be planned by the Proponent for the Peace-Athabasca Delta.

4.2.2 Site Preparation and Construction Details

The following subjects should be addressed in this section:

a) the construction schedule of each phase of the Project;

b) site preparation and construction methods to be used for all structures that could have a harmful effect on the environment such as clearing of timber for the reservoir and transmission lines, dredging, earth removal, blasting, placing and removing coffer dams, placement of containment dykes and associated drainage works, and water diversion techniques;

c) the acquisition of local construction materials and services, including rock, aggregate and other borrow materials, as well as forest products. Describe and quantify the materials and services, giving source locations and timing of extraction;

d) location of temporary and permanent access roads and transmission lines; describe the projected increased use (amount and type) of existing roads and transmission facilities; describe the construction of the new transmission line facilities including timing of construction, tower designs and locations, location of ancillary facilities, right-of-way access, and maintenance;

e) a description of the quantity and characteristics of effluents and emissions (e.g. water, air, noise) created during site preparation and construction phases, including the estimated area of potential impact;

f) a description of the location, size, duration, and service requirements of construction camps and the potential impacts on local communities, municipal services, environments (habitat loss and alteration) and wildlife;

g) estimates of the amount and types of fuels, explosives and hazardous materials that will be used; the method of transportation and frequency of trips; construction and environmental safety of storage facilities for fuel, explosives, and hazardous materials;

h) a description of the proposed waste materials management plan for this phase of the Project;

i) plans for environmental surveillance and monitoring during construction and plans for response to environmental emergencies, particularly at river flood stage levels.

4.2.3 Operation and Maintenance

a) describe the methods of commissioning the project and the anticipated effects, including the options, methods and timing (season, duration) of reservoir filling, and the environmental advantages and disadvantages of each option;

b) describe the Project waste materials management plan, giving information on the quantities, control, and disposal of wastes produced in this phase of the Project;

c) describe the sources of emissions creating ice fog and/or noise;

d) describe the anticipated mode of operation of the Project including the schedule of water discharges and reservoir storage levels, under mean, minimum and maximum flow conditions on the Slave River. The description should include estimated 100-year minimum and maximum flow conditions;

e) describe the requirements for operation staff housing to accommodate the influx of the work force, and the impact on local municipal services such as recreation facilities, health clinics, hospitals, transportation and communications;

f) describe the maintenance programs required on the transmission facilities, access roads, and the reservoir;

g) describe the estimated life of the reservoir under the preferred operating and maintenance regime;

h) describe a plan for environmental surveillance and monitoring during the operation of the project.

4.2.4 Abandonment

The plans for abandonment of all structures after useful life should be discussed in the EIS. This should include the physical rehabilitation and revegetation of disturbed areas such as campsites, borrowpits, supply dumps, access roads, and flooded areas, in all phases of the Project. Describe rehabilitation methodology, estimated recovery time, and predicted level of recovery. Describe land productivity, as being equal to or better than the pre-Project situation.

4.3 DESCRIPTION OF THE EXISTING ENVIRONMENT AND RESOURCE USE

The purpose of this section is to provide a description of the baseline environment and the physical, biological and socio-economic processes at work, with emphasis on those elements that are likely to be significantly affected. The description should be supported by reference to published material and original studies. Information gaps should be clearly noted.

A description should be given of present resource use covering domestic, commercial, and recreational use, making use of maps and charts.

This section should provide a sufficient basis for the prediction of impacts and for the identification and evaluation of mitigative measures.

4.3.1 Physical Environment

Significant aspects of the physical environment should be described. Attention should be directed to processes and natural changes likely to occur within the anticipated service life of the Project.

The following general categories of information should be addressed:

a) climate and air quality in the Project Area based on published climatic data;

b) geology, topography, and soils;

c) hydrology of rivers and streams, lakes, ground water, and surface waters, including ice conditions;

Specific details for this section are included in Appendix B.

4.3.2 Biological Environment

This section should cover the ecological processes and their role in the stability, productivity, variability, and resiliency of plant and animal populations, communities, and habitats, including:

a) terrestrial units including the Peace-Athabasca and Slave River Deltas;

b) birds and mammals;

c) fish and aquatic habitat.

Specific details for this section are included in Appendix C.

4.3.3 Socio-economic Environment, including Use of Resources

This section should describe the existing social environment and related economic factors for each community that would be affected by the proposed Project, bearing in mind that the Panel seeks information on matters for which the Federal Government has responsibility. It is expected that local people whose communities and lives will be affected by such a large scale project should be consulted as an important part of the EIS preparation.

The following information categories should be included:

a) demography;

b) social and cultural patterns;

c) services and facilities;

d) local business, industry and employment;

e) education and training;

f) cost of living;

g) land and resource use.

Specific details for this section are included in Appendix D.

4.4 ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATING MEASURES

This section should provide the focus for the Environmental Impact Statement, and should include a comprehensive discussion of potentially significant physical, biological, and socio-economic effects of the Project, including the pre-construction phase and the subsequent construction, operation and abandonment phases. The enhancement of desirable effects and the avoidance and mitigation of adverse effects should be fully discussed. The impact rating system should give the significance of the impacts as negligible, minor, moderate or major. The criteria for rating significance should also be given. Where possible the assessments should provide quantitative predictions of the impacts with confidence limits.

Estimates should be given of cumulative environmental and socio-economic effects associated with the Project. The extent and significance of knowledge gaps should be identified, particularly where deficiencies affect the reliability of impact prediction.

It will be important to describe the residual impacts after all mitigation measures have been taken. This description should be given in a separate section of the EIS.

4.4.1 Effects on the Physical Environment

This section should describe the expected physical impacts of each project alternative with emphasis on major physical disruptions within the area of federal interest. In particular, the description should cover the impacts on Wood Buffalo National Park, present and proposed Indian lands, the Peace-Athabasca Delta and the Slave River Delta, Lake Athabasca, Great Slave Lake, and on the upstream and downstream river regime on the Peace, Athabasca, Slave, and Mackenzie Rivers.

Both direct and indirect impacts should be described. For example, direct impacts would include river bank slumping, and erosion and loss of habitat to reservoir flooding. Indirect effects would include increased demand on local natural resources such as timber, wildlife, and recreational areas. The duration of impacts should be specified. A description should also be given of the feasibility of restoring flooded and severely disturbed lands to equal or better productivity at the termination of the project.

The elements of the physical environment to be addressed should include, but not be limited to, the following general categories and specific issues:

4.4.1.1 Climate and Air Quality

The type and size of a proposed reservoir may cause changes to the local and regional climate and to local terrestrial ecosystems. Predictions should be made on:

a) precipitation rates and patterns near the proposed reservoir, using references to other existing reservoirs, where possible;

b) extent of ice cover at present and with the project; estimates of freeze-up and break-up dates;

c) occurrence, duration and intensity of fog and ice fog caused by the project;

d) estimates of mean monthly evaporation levels;

e) increase in local wind effects and air quality changes, particularly local dust storms from the reservoir area and air pollutants from the Project.

4.4.1.2 Terrain

Construction activities, increased access, and the proposed reservoir could significantly affect land in the Project Area. The following subjects should be considered in detail, particularly items a to d, which are interrelated.

a) the potential effects of increased loading by reservoir waters on the geological stability of the area;

b) reservoir shoreline and river bank stability and erosion, particularly in the Fort Smith area and in reaches above and below the proposed dam site;

c) effects of impounded water in the reservoir on the permafrost regime in the Project Area;

d) reservoir leakage with particular reference to extensive karstic bedrock;

e) removal of surficial material during construction and operation;

f) impacts on unique landforms in the area;

g) mineral resources affected by the project.

4.4.1.3 Hydrology and Water Quality

Project activities and facilities may affect surface and ground water conditions in several ways. Descriptions should be provided of the following potential changes. All descriptions should be related to:

- Pre-Bennett Dam conditions where they are known;
- Present-day conditions with the Bennett Dam and with subsequent remedial water control structures;
- Conditions with the proposed Slave River Hydro Project in place.

In addition, a detailed description should be provided of the mathematical model used in the hydrological analysis as well as a brief explanation of the reason the particular model was chosen.

a) water quality in ground and surface water and in water bodies during construction, including the effects of spills of potentially harmful liquids and materials;

b) water quality during the project operation and maintenance phases, including potential for nitrogen supersaturation effects on fish downstream from the proposed spillway;

c) acidity of reservoir waters over the lifetime of the project and the potential for leaching of heavy metals from the bed of the reservoir;

d) changes in the river regime by the project including the effects of the dam and diversion works, changes in winter freeze-up and spring break-up dates, and the extent and impact of new flow channels in the Slave River valley above and below the proposed dam site;

e) sensitivity of the Proponent's operating regime to upstream or downstream activities, such as other upstream dams or diversions on downstream water use requirements.

f) patterns of ice formation, ice jamming, ice scour and break-up below the dam, including changes to erosion patterns and overbank flooding caused by alternative modes of Project operation, effects of frazil ice formation on construction and operation of the Project;

g) both upstream and downstream river and stream conditions, drainage patterns and run-off rates, sedimentation rates and distribution, and changes in water temperature and chemistry;

h) changes to the present conditions of groundwater hydrology;

i) changes to the permafrost regime through degradation of the ground ice;

j) changes to the present-day conditions which were created by the Bennett Dam and subsequent remedial measures (rock weir) especially changes to the number, size, and distribution of perched basins; this should include the effects of a proposed gated structure on either the Rivière des Rochers or the main stem of the Slave River.

4.4.2 Effects on the Biological Environment

Potential effects on plant and animal communities and their key components should be identified and thoroughly analyzed, including cumulative and synergistic effects with different project components. This section should include potentially significant effects on ecological relationships among the major species or groups of species, and impacts on ecological processes. Emphasis should be placed on unique plant associations and on rare or endangered species likely to be affected.

The following elements and concerns should be covered in this section and attention should be paid to the commercial, domestic, recreational, and aesthetic implications of project-induced impacts and changes:

a) effects on the terrestrial environment, particularly by fluctuating water levels and changes to riparian plant succession, plant distribution and abundance on the flooded perimeter of the reservoir, and on the wetted perimeter of the river downstream of the dam, including the ecological effects of reservoir waters flowing into and fluctuating in muskeg depressions;

b) effects on aquatic habitats, particularly by flooding, flow changes, and ice conditions;

c) effects of reservoir and downstream river levels and the timing and duration of fluctuations on nesting and staging areas for waterfowl, on habitats for aquatic mammals, particularly muskrat and beaver, and on bison habitats in grasslands, sedge meadows, and shrublands. Where new habitat for wildlife will be created by the Project, a description should be given of the locality and extent of habitat and the carrying capacity for local wildlife species. An estimate should be given of the time for secondary plant succession to reach stability;

d) potential disruption of food chains in aquatic environments, including loss of aquatic vegetation, micro-organisms, zooplankton and fish species; disruption of food chains in terrestrial environments should include loss of vegetation and critical habitat for all major species;

e) changes in animal populations, species diversity, and quality. This section should include the subject of introduction of fish species, e.g. lampreys, fish parasites, and diseases into the upper reaches of the Slave River system; the effects on the fishery, as well as the potential effectiveness of lampricides; and the risk of increased mercury contamination in fish from increased mercury concentration in reservoir waters. In addition, the section should cover effects on species described as rare or endangered in the region, in Alberta and in Canada, including bison, bald and golden eagles, the Caspian tern, white pelican, peregrine falcon, and whooping crane. The possible impacts on amphibians (boreal chorus and wood frogs) and reptiles (red-sided garter snake) should also be described;

f) changes to present-day fish spawning and rearing habitats brought about by the Project, and a forecast description of the location and characteristics of fish habitats after the Project is in place. Information should be presented in a format similar to that recommended by Hynes, 1970.[2] Options should be presented for enhancing existing fish habitat and creating new habitat to replace losses;

g) other effects of the Project on fish and wildlife species including increased exploitation by hunting and fishing, disturbance caused by increased access, and the impact on migrations and movements of fish and wildlife. Particular attention should be paid to impacts of the proposed transmission line system on ducks, geese, swans, and whooping cranes. The practicality of buried transmission lines in sensitive areas should be discussed;

h) the potential for the spread of the anthrax caused by flooding of ground contaminated by anthrax spores;

i) the feasibility and desirability of the proposed dam and reservoir and any additional proposed control structures to enhance the productivity of the Peace-Athabasca Delta by the creation of conditions comparable to the pre-Bennett Dam regime. This section should include potential trade-offs between economic feasibility and biological productivity, and between the expansion of one habitat and the loss or modification of another habitat;

j) for the Peace-Athabasca Delta and other parts of the Project area, the effects of transmission line construction and operation on the staging and production areas of ducks, geese, swans, terns, pelicans, and whooping cranes, with particular reference to:

    1. timing of transmission line construction;

    2. use of buried transmission lines;

    3. tower design and location including tower height, visibility, and lighting;

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[2] Ecology of Running Waters, H. Hynes, University of Toronto Press, 1970.

4. location of ancillary facilities, access roads and right-of-way maintenance.

All feasible mitigative measures for the proposed transmission lines should be described.

k) effects of the options of either clearcutting the trees from the proposed reservoir area or leaving the timber in place; partial clearing options should also be examined. The effects should cover the following subjects:

    1. water quality in the proposed reservoir and downstream in the Slave River;

    2. the economic, recreational and aesthetic consequences of not clearcutting trees from the proposed reservoir area. The economic review should include a cost/benefit analysis, including the foregone sale of timber;

    3. description of logging operations which would be required to remove the trees in the reservoir area;

    4. effects on fish and wildlife populations.

4.4.3 Effects on the Socio-Economic Environment

Keeping in mind that this is a review of matters of interest to the Federal Government, this section should provide a description and analysis of the potential impacts of the project on the socio-economic environment, including those which are of a local nature and those which are regional and national.

The contribution of northerners in the preparation of this section is important. The Proponent's methods and program of consultation should be described. Consultations should be held with all Indian bands, Metis Associations, town and municipal governments, and special interest groups in the Project Area, including the Development Impact Zone Group. Plans for continued consultation to obtain future input from these people should also be provided. The positive and negative project impacts on native and non-native people in the area should be thoroughly discussed. This information should include the predicted effects on each community in the Project Area.

A number of different local groups and organizations, and the Government of the N.W.T. have identified social and economic measures that they consider essential if the dam is to proceed with either minimum negative socio-economic impacts or maximum positive socio-economic ones. The proponent should identify the impacts forecast by the groups and organizations, evaluate the feasibility of the actions suggested by the groups to mitigate or eliminate potential socio-economic problems, and identify the extent to which the proponent can eliminate the socio-economic problems identified through adoption of the actions suggested or alternatives to them.

The proponent should also indicate, (with reference to the discussions) agreements or formal undertakings with the groups concerned, on how action programs will be implemented to mitigate or eliminate potentially adverse socio-economic effects.

Social and economic impacts and trends should be described under the three following different assumptions:

a) the proposed Project is built;

b) an alternative form of the proposed Project is built;

c) that the Project does not go ahead.

The discussion of socio-economic impacts and proposed mitigating measures should cover the direct and indirect effects of Project location, construction, operation and abandonment and include, but not be limited to, the following:

a) Demography
- both short and long-term demographic changes. A description should be made of the size, composition, and distribution of the construction labour force in the area over the construction period. The estimated permanent work force at the Project should also be described;

b) Social and Cultural Patterns
- social and cultural patterns and expected changes including effects on the existing social infrastructure in communities and settlements;

- the effect of the project on established native rights and unsettled native claims and treaty entitlements.

c) Services and Facilities
- effects of the Project on community social and institutional services such as health care, social assistance programs, police and fire protection, recreational facilities, schools, and the need for additional services to meet project-related demands. Particular attention should be given to the impact of construction camps on these services and on the local housing situation, and on the local price of goods and services and on municipal and government revenues and expenditures. The following alternative arrangements for workers housing should be covered:

    1. construction camps isolated from settlements, and means of achieving isolation;

    2. camps within or adjacent to existing communities;

3. combinations of 1. and 2. to accommodate different segments of the work force in different situations;

- effects on community services such as water supply, sewage and solid waste disposal, roads, and power generation and distribution, on the need for additional services to meet development-related demands;
- effects on local and regional transportation facilities and services, including accommodation of Project employees;
- effects on existing telecommunications services and on the need for and provision of new telecommunication facilities and services.

d) Local Business, Industry and Employment

- plans to give local businesses and industries early notification and encouragement of business opportunities;
- a description of the capability and opportunities for local businesses to participate in Project-related assignments;
- effects of Project demand for labor on the local and regional labor force;
- competition between Project-related manpower requirements and those of existing business, agencies, institutions and traditional activities;
- impact of Project employment and wages on local labor force wage levels and the potential effects on life-styles and economic activity;
- effects of union involvement on opportunities for local employment and business opportunities.

e) Education and Training

- description of required job occupations, wages, locations, numbers, skills, and duration, Project schedules and work force schedules;
- access by northerners to employment opportunities and training to enable northerners to take advantage of job opportunities;

f) Cost of Living

- changes in the cost of living during the life of the Project, including the potential social effects of the post-construction downturn in employment and business opportunities.

g) Land and Resource Use, including hunting and trapping

- effects on present and projected land use, resource management and exploitation, transportation on land and water, and industrial activity; include the effects of the proposed winter operating regime on ice formation and ice quality both upstream and downstream of a dam, in relation to winter over-ice transportation and access to the east side of the Slave River;

- effects on water management agreements for the Mackenzie River Basin;

- effects on municipal and regional development plans and the Wood Buffalo National Park Management Plan;

- effects on Wood Buffalo National Park historic and archaeological sites during all phases of the Project, and procedures designed to ensure site preservation. Also, the effect on other historical, archaeological, and paleontological sites in the Project Area;

- effects on tourism and recreational resources and opportunities of the Project area, particularly Wood Buffalo National Park; noise and visual effects should be included as well as a landscape plan where screening is identified to reduce the visual impact of transmission towers, borrow pits and the right-of-way;

4.5 RESIDUAL IMPACTS

Residual impacts are environmental and socio-economic impacts that remain after all practical mitigation measures have been incorporated into the Project proposal. It will be important for the EIS to contain a description of residual impacts, with emphasis on quantification of the impacts and on the extent and duration of the effects. The implications should be given for the locality and the region. The impacts should be rated as negligible, minor, moderate, and major. Of particular importance are those residual impacts which will foreclose certain options and opportunities with respect to future land and resource use and productivity in the Project Area.

If further information is required to assess fully a particular residual impact and to provide for its mitigation, then the Proponent should undertake studies to obtain the information that is necessary to complete the assessment.

Procedures should be described for the determination of equitable and expeditious compensation for losses of resources and livelihood, and with reference to existing compensation arrangements such as the Alberta Surface Rights Board and the Trappers Compensation Review Board.

4.6 MONITORING

A description should be provided of plans to monitor the Project effects, including the residual impacts, based upon a detailed analysis of the identified environmental and social concerns. The description should include:

1. the proposed monitoring plan and its scope;
2. the monitoring agency or agencies, and the reporting relationships;
3. the proposed measurement standards to be used in monitoring and the proposed methods to ensure quality control in monitoring.

This section should specify the environmental and socio-economic aspects requiring monitoring during the construction and operation stages of the Project. Reference should be made to the relevant baseline information and data to be used in the monitoring program. The discussion should include an analysis of the utility and the limitations of the baseline information for the purposes of monitoring.

4.7 APPENDICES

Appendices to the EIS should include:

a) a glossary of all important technical and scientific terms used in the EIS, which may not be readily understandable by reviewers, including the public;

b) lists of references cited in the EIS, literature which is used but not cited, and locations of cited unpublished reports;

c) lists of reports produced from studies associated with the EIS, including consultants' reports.

Reports and documents not readily accessible to the public upon which key conclusions are based should be cited and made available to the Panel upon request. Additional copies of this material must be made available at the same time for public perusal at locations to be determined.

GUIDELINE APPENDICES

APPENDIX A

Definitions

The following definitions of terms used in this document are presented here to aid readers.

Environmental Assessment Panel (Panel):

- an independent group of specialists appointed to review the environmental and related socio-economic effects of the Project for the federal government.

Environmental Impact Statement (EIS):

- a documented assessment of the environmental and related socio-economic effects of a proposed project or activity which may have significant environmental consequences. The EIS is prepared early in the planning stages by the Proponent in accordance with Guidelines established by the Panel undertaking the review.

Initiator:

- a federal department or agency which undertakes federal government responsibility for the review of a project having possible environmental effects and which takes appropriate action according to the Federal Environmental Assessment and Review Process. In this review Parks Canada of the Federal Department of the Environment is the initiating department.

Proponent:

- a company, province or federal agency which intends to undertake a project, or group of projects having possible environmental effects. At the time of issuing these guidelines, the Proponent for the Slave River Hydro Project had not been named.

Project:

- the proposed construction and operation of hydroelectric generating facilities on the Slave River near the Alberta-Northwest Territories boundary, including a reservoir, control structures, transmission lines, substations and a road network, including existing and proposed temporary and permanent roads.

Project Area:

- all areas potentially affected, both permanently and temporarily, by the construction, operation, and abandonment of the Project including, but not limited to:

1. Wood Buffalo National Park

2. Slave River - its tributaries and adjacent land

3. Slave River Delta

4. The lower reaches of the Peace and Athabasca Rivers and their tributaries

5. Peace-Athabasca Delta, including Richardson Lake and the Chipewyan Band Reserve #201

6. Lake Athabasca

7. Great Slave Lake

8. Areas traversed by major transmission lines, south to Fort McMurray and north to any intertie with the Northern Canada Power Commission system in the Northwest Territories

Associated Projects:

- all other projects that would be undertaken in support of, or in addition to, a proposed Slave River Hydroelectric Project, which would occur as a direct result of the Project. Include all projects which may be constructed and operated independently of the Project but which could contribute to cumulative impacts.

APPENDIX B

Outline of Specific Components to be Included in the Description of the Existing Physical Environment.

This appendix lists the components to be included in the description of the existing physical environment in section 4.3.1. The focus should be a description of aspects of the physical environment and scientific issues and concerns related to the Project and its alternatives, which are relevant to impact prediction and mitigation.

A.1 Climate and Air Quality

a) monthly and annual means and extremes of temperature and precipitation, including snow depth, wind speed, chill factor and heating degree days;

b) monthly statistics on the frequency of temperature inversions, fog and ice fog, smoke, haze, freezing precipitation, blowing snow, thunderstorms and hail;

c) an estimate, given by month, of the frequency and duration of those weather parameters which the Proponent considers to be critical to the operation of the Project, such as wind speed, low and high temperatures, rainfall intensity, freezing precipitation, wind chill, heating degree days, temperature inversions, fog, smoke and haze;

d) available data on acid precipitation in the area;

e) estimates of monthly evaporation rates.

The climatic and air quality section should discuss those elements of the weather which could be affected by the Project, and conversely, which may have significant effects on project operations. Where recorded climatic data are not available, then estimates should be provided with confidence limits.

All weather recording stations in the Project Area should be noted and located on an area map. Where climatic data have been extrapolated from records outside of the Project Area, then the location and length of record of the station should be noted.

A.2 Geology, Topography and Soils

The Slave River valley and the Slave and Peace-Athabasca Deltas and major transmission line routes should be mapped using an Ecological Land Survey Guidelines for Environmental Impact Analysis approach. The ecosection level of detail should be used for general aspects and the ecosite level should be used for areas to be flooded or crossed by roads or transmission lines. The information should be described in text form with accompanying maps of appropriate scale and contour interval and should include the following:

a) topography, landforms, surficial geology, bedrock geology (including karst features), and major soil types;

b) seismic risk and terrain stability, including bank stability, soil permeability characteristics, and erosion potential of the reservoir shoreline and the Slave River shoreline below the dam;

c) significant, sensitive, or unique geological features and landforms;
d) extent and characteristics of permafrost;

e) location and suitability of construction and borrow materials for the Project.

A.3 Hydrology

Describe important parameters of ground and surface waters in the Project Area by means of standard, accepted methods. The normal seasonal variations and expected maxima and minima of these parameters should also be discussed. Include:

a) physical features of the Slave, the Peace, and the Athabasca rivers and major lakes including water temperature and annual sediment loads (both suspended load and bed load);

b) chemical features of the lakes and rivers, suspended sediments, and potentially flooded soils;

c) hydrological features such as rates and levels of river flow and lake levels in pre- and post-Bennett dam conditions; number, size, and distribution of perched basins; duration, thickness, and extent of ice cover and progression of freeze-up and break-up including the frazil ice stage; and ground water levels, flow rates, and directions;

d) water parameters with biological implications such as quantity and nutrient composition (carbon, nitrogen, phosphorus) of suspended sediments; monthly and annual flux of dissolved, suspended and particulate nutrients, both major and trace elements, including heavy metals; measures of biological productivity such as chlorophyll content and rates of carbon fixation.

APPENDIX C

Outline of Specific Components to be Included in the Description of the Existing Biological Environment.

The biological environment should be described in terms of plant community associations and their components in key wildlife habitats with emphasis placed on the ecological processes influencing ecosystem stability, productivity, variability and resiliency.

In describing the biotic components of the communities, key factors in their life requirements should be described including critical habitat, food, seasonal distributions and movements, and natural population-limiting mechanisms. The sensitivity of communities and species and their vulnerability to man-induced changes to their natural circumstances should be discussed. Both scientific and common names should be included for all species of flora and fauna mentioned.

The description of the biotic components of communities, should include:

B.1 Terrestrial Units including the Peace-Athabasca and Slave Deltas

a) mapping of the Slave River Valley, the Slave Delta and the Peace-Athabasca Delta according to the Ecological Land Survey Guidelines for Environmental Impact Analysis to an appropriate level of detail for general aspects and to a more detailed level for areas to be flooded and crossed by roads and transmission lines. Describe the predominant changes in successional patterns resulting from alteration of the water regime by the Bennett Dam.

b) forestry, with types of production and value supported by forest cover maps that include species and size classes as an aid to determining costs and benefits of clearing the reservoir.

B.2 Birds and Mammals

a) population size, seasonal distribution, and dynamics of species that could be affected by the Project. This should include species considered to be of significance with respect to their commercial, domestic, recreational, scientific, ecological or aesthetic value;

b) special requirements for species mentioned under item a) should also be described. These include critical seasonal feeding areas, nesting locations, moulting and staging areas, migration routes and the timing of these activities;

c) identification and details of migration patterns and daily and seasonal habitat use. This should include low level avian flight paths;

d) critical wildlife habitat and the habitat requirements of rare, endangered or threatened species should be documented and described particularly with reference to the importance of the habitat to population survival and sustained abundance;

e) size and value of past and present recreational, domestic and commercial harvests of species.

B.3 Fish and Aquatic Habitat

a) seasonal distribution and abundance of juvenile and adult anadromous and fresh water fish;

b) critical fish habitat including migration routes, spawning, nursery and feeding areas should be documented and described particularly with reference to the importance to population survival and sustained abundance;

c) size and value of the past and present recreational, domestic and commercial fishery.

APPENDIX D

Outline of the Specific Components to be Included in the Description of the Existing Socio-Economic Environment and Resource Use.

This appendix provides a more detailed listing of components of the socio-economic environment section of the EIS. The description and discussion of the social and related economic activities of the Project area should form the basis for the prediction of impacts and mitigating measures to be found in subsequent sections.

C.1 Demography

A descriptive analysis of the population in Project area communities with information on distribution by age, sex and ethnic background.

C.2 Social and Cultural History and Existing Patterns

- social, cultural and historical profile of each of the communities and the region in general;
- pre-historic and historic archaeological sites in the region;
- community social patterns, attitudes and life-styles with residents' perceptions and expectations for the development of each community;
- local attitudes and cultural values associated with renewable resource harvesting.

C.3 Services and Facilities

- community infrastructure including municipal services, police services, health and social services, and housing;
- transportation and communication services and facilities;
- the cost of living in potentially affected communities with emphasis on those factors that could change as a result of the Project.

C.4 Local Business, Industry and Employment

- basis of community economic activities including forestry, mining, transportation, recreation, trapping, fishing, construction and tourism;
- employment rates, income ranges of residents and business potential in the communities and the region;
- estimated percentage of the local and regional labour force that may reasonably be expected to be employed by the Project in construction and operation.

C.5 Education and Training

- levels of Project-related education, training and skills by age and sex;
- availability of job-related training programs.

C.6 Land and Resource Use

The nature, extent and location of past and present land and resource use should be described and mapped including:

a) mining properties;

b) scenic, wilderness and recreational use of land and local attitudes in respect to land use and resource management of parks, ecological reserves, game preserves and other recreational areas. Special reference should be made to the value of Wood Buffalo National Park as perceived locally and nationally;

c) residential, commercial and industrial land use and water use;

d) traditional resource harvesting activities such as hunting, fishing and trapping; specify areas used for harvesting particular species, seasons of harvesting activities, and travel and access routes used in reaching harvesting locations;

e) public and private land ownership with reference to unsettled native claims;

f) special land interests including leases (grazing), mineral claims, water rights, cutting rights (timber), trappers' cabins, and licences of land occupation.

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